

SPECIFICATIONS FOR NICHIA UV LED

MODEL : **NSHU590**

NICHIA CORPORATION

1.SPECIFICATIONS

(1) Absolute Maximum Rating

(Ta=25°C)

Item	Symbol	Absolute Maximum Rating	Unit
Forward Current	I _F	15	mA
Pulse Forward Current	I _{FP}	50	mA
Reverse Current	I _R	85	mA
Power Dissipation	P _D	60	mW
Operating Temperature	T _{opr}	-30 ~ + 85	°C
Storage Temperature	T _{stg}	-40 ~ +100	°C
Lead Soldering Temperature	T _{sol}	260 ± 5°C for 5sec.	

I_{FP} Conditions : Pulse Width ≤ 10msec. and Duty ≤ 1/10

(2) Initial Electrical/Optical Characteristics

(Ta=25°C)

Initial Electrical/Optical Characteristics (Ta=25°C)							
Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Forward Voltage		V _F	I _F =10[mA]	-	3.5	4.0	V
Peak Wavelength		λ _P	I _F =10[mA]	370	375	380	nm
Spectrum Half Width		△λ	I _F =10[mA]	-	12	-	nm
Optical Power Output	Rank 1	P _o	I _F =10[mA]	425	500	600	μW
	Rank 2	P _o	I _F =10[mA]	600	700	850	μW
	Rank 3	P _o	I _F =10[mA]	850	1000	1200	μW

* Measurement Uncertainty of the Optical Power Output : ±10%

** Measurement Uncertainty of the Peak Wavelength : ±3nm

*** One delivery will include three different ranks of products. The quantity-ratio of the three ranks is decided by Nichia.

2.TYPICAL INITIAL OPTICAL/ELECTRICAL CHARACTERISTICS

Please refer to figure's page.

3.OUTLINE DIMENSIONS AND MATERIALS

Please refer to figure's page.

Material as follows ; Glass : Hard Glass
 Cap : Ni Plating Iron Alloy
 Lead : Au Plating Iron Alloy

4.PACKAGING

Please refer to figure's page.

The label on the minimum packing unit bag shows;

Part Number, Lot Number, Quantity, Ranking

5.LOT NUMBER

The first six digits number shows **lot number**.

The lot number is composed of the following characters;

○□×××× - △■

○ - Year (0 for 2000, 1 for 2001)

□ - Month (1 for Jan., 9 for Sep., A for Oct., B for Nov.)

×××× - Nichia's Product Number

△ - Ranking by Color Coordinates

■ - Ranking by Luminous Intensity

6.RELIABILITY

(1) TEST ITEMS AND RESULTS

Test Item	Standard Test Method	Test Conditions	Note	Number of Damaged
Resistance to Soldering Heat	JIS C 7021 (1977)A-1	Tsol=260 ± 5°C, 10sec. (3mm from the base of the epoxy bulb)	1 time	0/100
Solderability	JIS C 7021 (1977)A-2	Tsol=235 ± 5°C, 5sec. (using flux)	1 time over 95%	0/100
Heat Shock	JIS C 7021 (1977)A-3	0°C ~ 100°C 5sec. 15sec.	100 cycles	0/100
Temperature Cycle	JIS C 7021 (1977)A-4	-40°C ~ 25°C ~ 100°C ~ 25°C 30min. 5min. 30min. 5min.	100 cycles	0/100
High Humidity Heat Cycle	JIS C 7021 (1977)A-5	30°C ~ 65°C ~ -10°C 90%RH 24hrs./1cycle	10 cycles	0/100
Mechanical Strength of Terminal (bend test)	JIS C 7021 (1977)A-11	Load 2.5N (0.25kgf) 0° ~ 90° ~ 0°bend 3 times	No noticeable damage	0/100
Mechanical Strength of Terminal (pull test)	JIS C 7021 (1977)A-11	Load 10N (1kgf) 30 ± 1 sec.	No noticeable damage	0/100
High Temperature Storage	JIS C 7021 (1977)B-10	Ta=100°C	1000hrs.	0/100
Humidity Heat Load	JIS C 7021 (1977)B-11	Ta=60°C, RH=90%	1000hrs.	0/100
Low Temperature Storage	JIS C 7021 (1977)B-12	Ta=-40°C	1000hrs.	0/100
Life Test	JIS C 7035 (1985)	Ta=25°C, IF=15mA	1000hrs.	0/100
High Humidity Heat Life Test		60°C, RH=90%, IF=10mA	500hrs.	0/100
Low Temperature Life Test		Ta=-30°C, IF=10mA	1000hrs.	0/100

(2) CRITERIA FOR JUDGING THE DAMAGE

Item	Symbol	Test Conditions	Criteria for Judgement	
			Min.	Max.
Forward Voltage	V _F	I _F =10mA	-	U.S.L.*) × 1.1
Optical Power Output	P _o	I _F =10mA	L.S.L.***) × 0.7	-

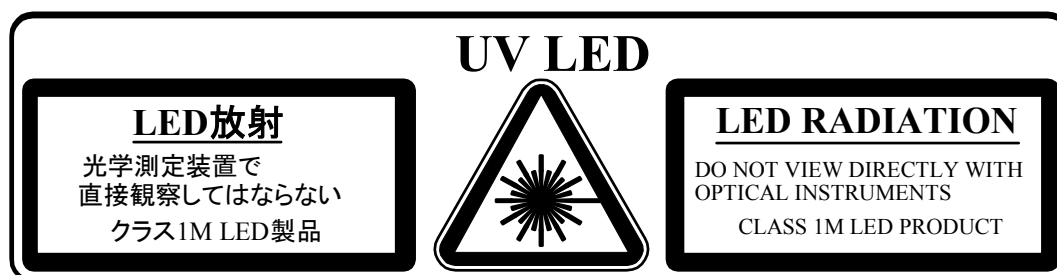
*) U.S.L. : Upper Standard Level

**) L.S.L. : Lower Standard Level

7.CAUTIONS

(1) Cautions

- The devices are UV light LEDs. The LED during operation radiates UV light. Do not look through the optical system.
- Put label which meets the IEC 60825-1 Amendment 2 standard on the cardboard box.



(2) Lead Forming

- When forming leads, the leads should be bent at a point at least 3mm from the base of the lead. Do not use the base of the lead as a fulcrum during lead forming.
- Lead forming should be done before soldering.
- Do not apply any bending stress to the base of the lead. The stress to the base may damage the LED's characteristics or it may break the LEDs.
- When mounting the LEDs onto a printed circuit board, the holes on the circuit board should be exactly aligned with the leads of the LEDs. If the LEDs are mounted with stress at the leads, it causes deterioration of the can and this will degrade the LEDs.

(3) Soldering Conditions

- Solder the LEDs no closer than 3mm from the base of the lead.
- Maximum Allowable Soldering Conditions

Soldering	Solder Dipping
Soldering Iron : 30W Max.	Pre-Heat : 100°C Max.
Temperature : 300°C Max.	Pre-Heat Time : 60 seconds Max.
Soldering Time : 3 seconds Max.	Solder Bath Temperature : 260°C Max.
Position : No closer than 3 mm from the base of the lead.	Dipping Time : 5 seconds Max.
	Dipping Position : No lower than 3 mm from the base of the lead.

- Do not apply any stress to the lead particularly when heated.
- The LEDs must not be repositioned after soldering.
- After soldering the LEDs, the glass should be protected from mechanical shock or vibration until the LEDs return to room temperature.
- Direct soldering onto a PC board should be avoided. Mechanical stress to the resin may be caused from warping of the PC board or from the clinching and cutting of the leads. When it is absolutely necessary, the LEDs may be mounted in this fashion but the User will assume responsibility for any problems. Direct soldering should only be done after testing has confirmed that no damage such as wire bond failure or glass deterioration will occur. Nichia's LEDs should not be soldered directly to double sided PC boards because the heat will deteriorate the glass.
- When it is necessary to clamp the LEDs to prevent soldering failure, it is important to minimize the mechanical stress on the LEDs.
- Cut the LED leads at room temperature. Cutting the leads at high temperature may cause failure of the LEDs.

(4) Heat Generation

- Heat generation must be taken into design consideration when using the LEDs. The coefficient of temperature increase per input electric power at room temperature is about 0.75 degrees C/mW at the LED's active layer. This temperature gets higher when the LEDs are densely mounted. It is necessary to design the circuit so that the operating conditions are within the absolute maximum ratings.
- The operating current should be decided after considering the ambient maximum temperature when the LEDs are illuminating.

(5) Static Electricity

- Static Electricity and surge damages the LEDs.
It is recommended to use a wrist band or anti-electrostatic glove when handling the LEDs.
- All devices, equipment and machinery must be properly grounded.
When inspecting own final products on which LEDs were mounted, it is recommended to check also whether the mounted LEDs are damaged by static electricity or not. It is easy to find static-damaged LEDs by Vf test at lower current.
- Damaged LEDs will show some unusual characteristics such as starting forward voltage becomes lower, or the LEDs get unlighted at the low current.
Test method : ($V_F > 2.5V$ at $I_F=0.5mA$)

(6) Cleaning

- When washing is required, isopropyl alcohol should be used.
- The influence of ultrasonic cleaning on the LEDs differs depending on factors such as oscillator output and how the LEDs are mounted. Before cleaning by ultrasonic wave, testing should be performed to ensure this will not cause damage to the LEDs.

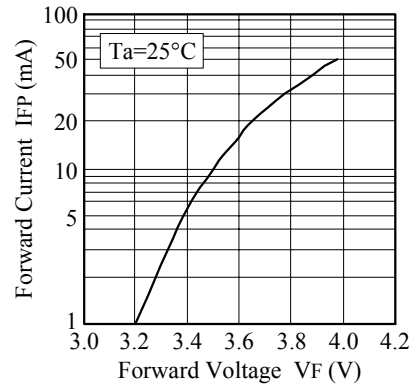
(7) Safety Guideline for Human Eyes

- In 1993, International Electric Committee issued a standard "IEC 825-1" which is related to the safety of Laser products. This standard is also applicable Light Emitting Diode. Since the issuance of "IEC 825-1", it had been examined to ease the control of diffused light source. As the result of the review, a new measuring method, which cares the size of the light source, was introduced with "IEC 60825-1 Edition 1.1" in 1998. Also Laser products were categorized into seven classes with "IEC 60825-1 Amendment 2" in 2001. These standards are subject only to final products and excluding assembled parts for the final products. According to "IEC 60825-1 Amendment 2", most of individual visible-LED is classified as "Class 1" and UV LED is classified as "Class 1M". The class of LEDs depends on light output power and/or viewing angle and some visible-LEDs with higher output power or narrow viewing angle might be categorized as "Class 2". There is a possibility to give damage to your eyes if you directly watch LEDs when the LEDs are emitting higher output power or the emitted light is intensified by optical equipment. According to the light output power of the final products, you need to put labels which meet the IEC standard.

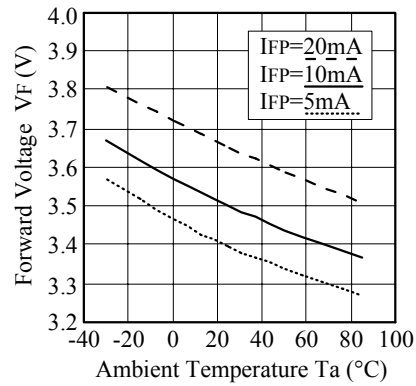
(8) Others

- The leads are plated with gold. They will become discolored by contact with hydrogen sulfide and other gaseous chemicals. Precautions must be taken to maintain a clean storing atmosphere. Also, if the LEDs are stored for 3 months or more after being shipped from Nichia, a sealed container with a nitrogen atmosphere should be used for storage.
- These LEDs described in this brochure are intended to be used for ordinary electronic equipment (such as office equipment, communications equipment, measurement instruments and household appliances). Consult Nichia's sales staff in advance for information on the applications in which exceptional quality and reliability are required, particularly when the failure or malfunction of the LEDs may directly jeopardize life or health (such as for airplanes, aerospace, submersible repeaters, nuclear reactor control systems, automobiles, traffic control equipment, life support systems and safety devices).
- User shall not reverse engineer by disassembling or analysis of the LEDs without having the prior written consent of Nichia. When defective LEDs are found, User shall inform to Nichia directly before disassembling or analysis.
- The formal specifications must be exchanged and signed by both parties before large volume purchase begins.
- The appearance and specifications of the product may be modified for improvement without notice.

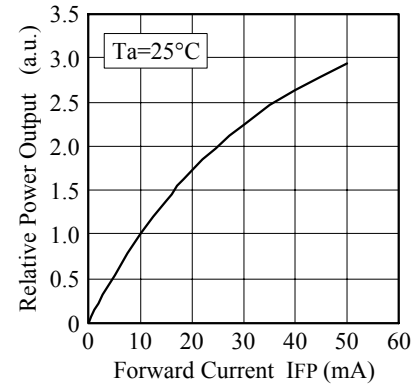
■ Forward Voltage vs.
Forward Current



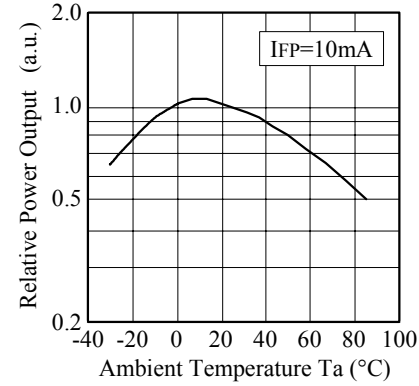
■ Ambient Temperature vs.
Forward Voltage



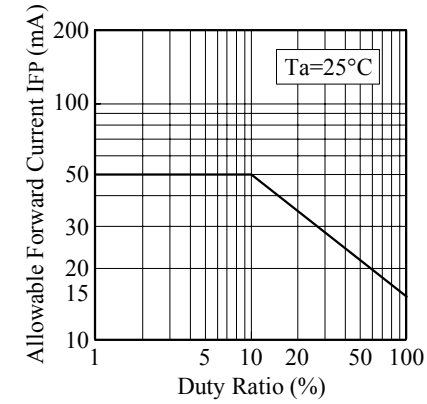
■ Forward Current vs.
Relative Power Output



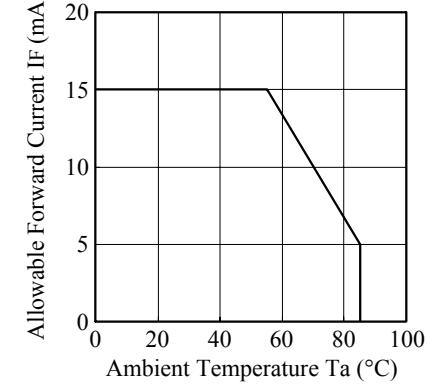
■ Ambient Temperature vs.
Relative Power Output



■ Duty Ratio vs.
Allowable Forward Current



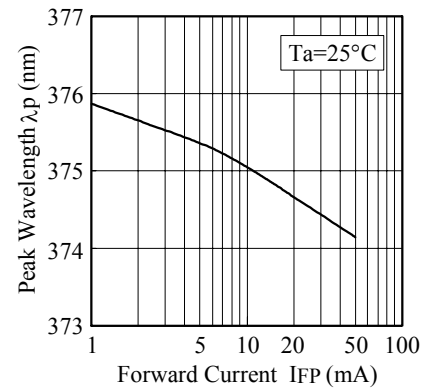
■ Ambient Temperature vs.
Allowable Forward Current



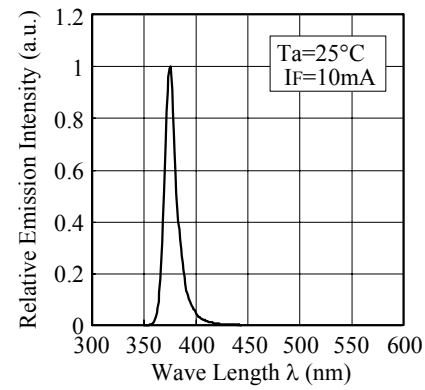
NICHIA CORPORATION

Model	NSHUxxx
Title	TYP.CHARACTERISTICS
No.	010402101811

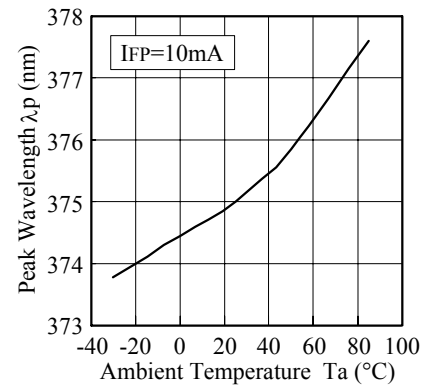
■ Forward Current vs.
Peak Wavelength



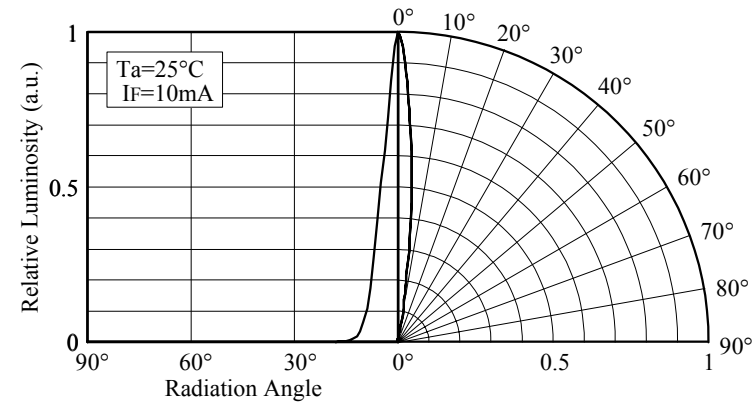
■ Spectrum



■ Ambient Temperature vs.
Peak Wavelength



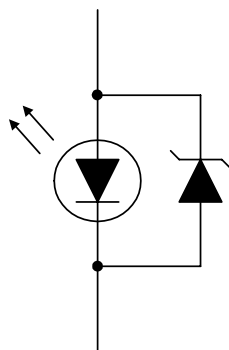
■ Directivity (NSHU590)



NICHIA CORPORATION

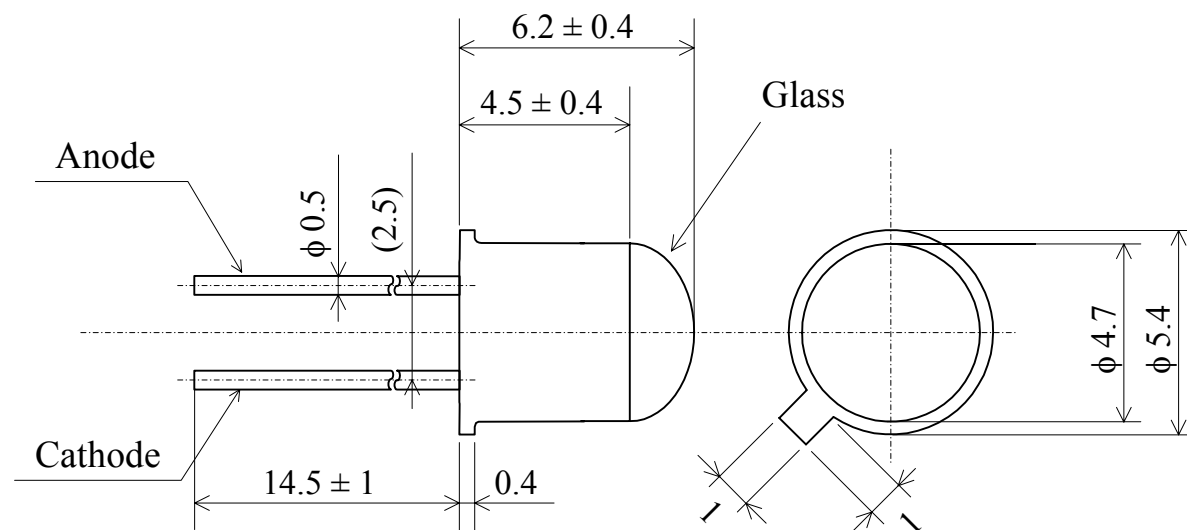
Model	NSHU590
Title	TYP.CHARACTERISTICS
No.	010402101831

Internal Circuit



Side View

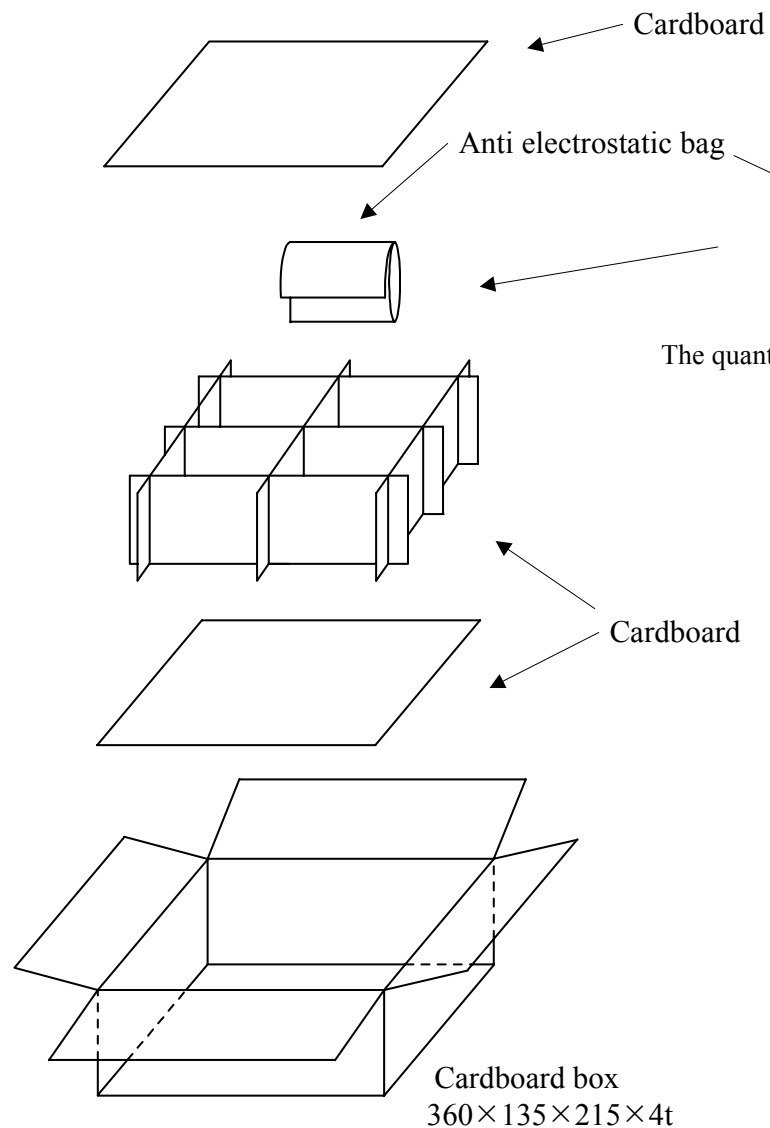
Top View



* NSHU590 has a zener diode built in as a protection circuit against static electricity.

ITEM	MATERIALS	
GLASS	Hard Glass	
CAP	Ni Plating	Iron Alloy
LEAD	Au Plating	Iron Alloy

NICHIA CORPORATION	Model	NSHU590	Unit mm
	Title	OUTLINE DIMENSIONS	
	No.	010903106161	Allow ± 0.2



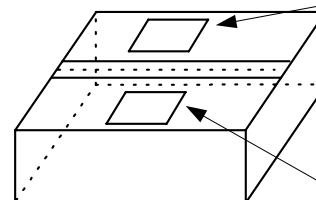
* One box contains 8 bags at maximum.

The quantity is printed on this bag.

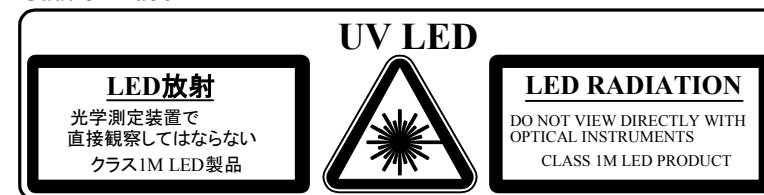
Print



Label

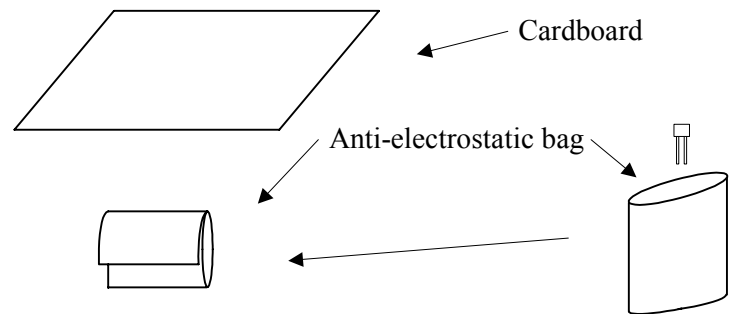


Caution Label



* Put the label and caution label on the cardboard box.

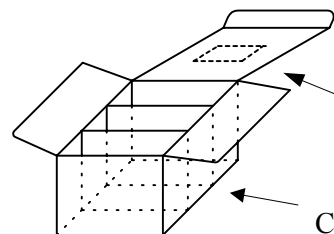
NICHIA CORPORATION	Model	NSHUxxx	
	Title	PACKING	
	No.	010825101993	



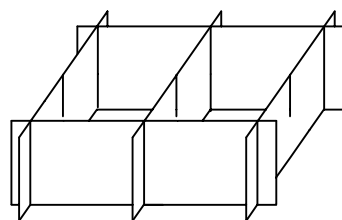
Cardboard

Anti-electrostatic bag

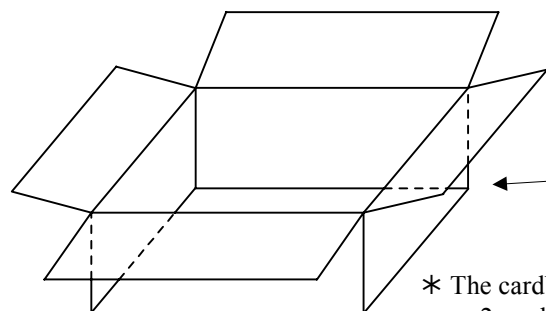
The quantity is printed on this bag.



Cardboard box A



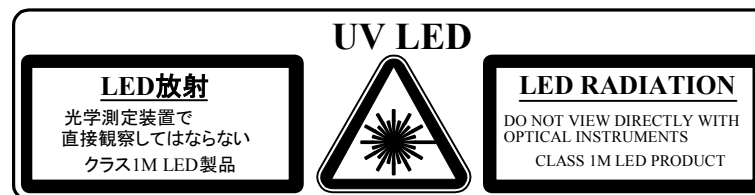
Cardboard



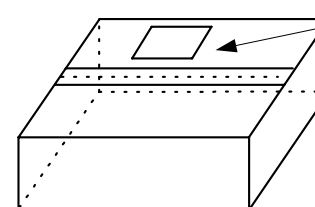
Cardboard box B
360×135×215×4t

* The cardboard box B contains
2 cardboard box A at maximum.

Caution Label



* Put the caution label on the cardboard box A.



Print



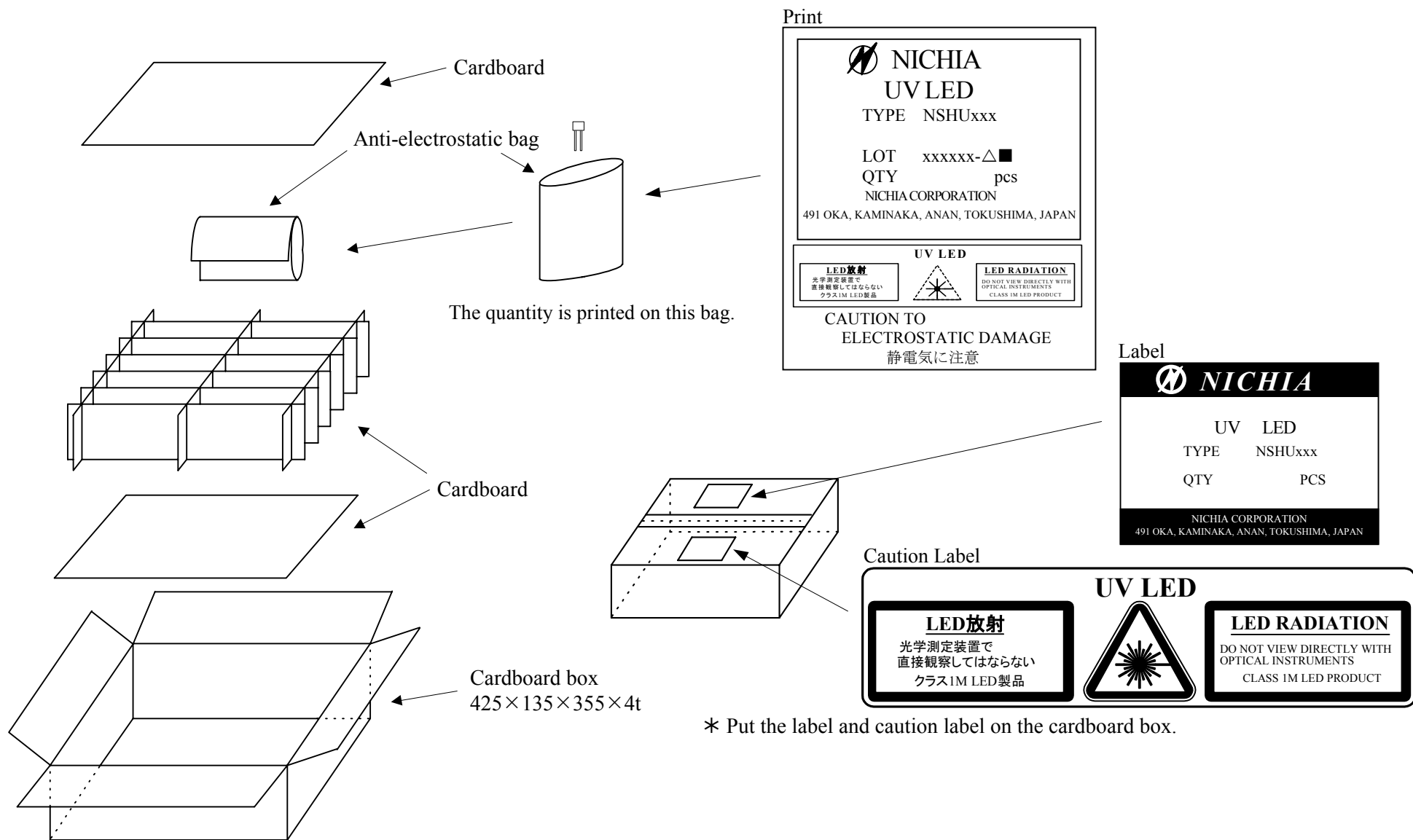
Label



* Put the label on the cardboard box B.

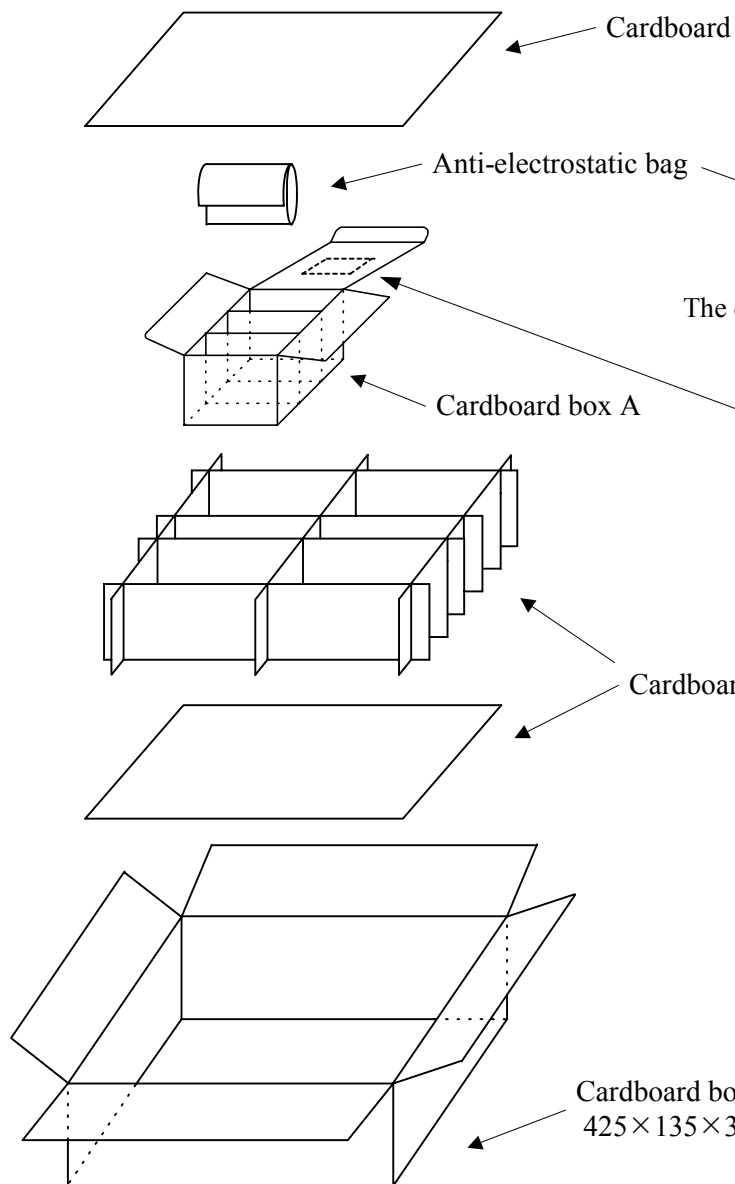
NICHIA CORPORATION

Model	NSHUxxx
Title	PACKING
No.	010825102003



* One box contains 20 bags at maximum.

NICHIA CORPORATION	Model	NSHUxxx	
	Title	PACKING	
	No.	010825102013	



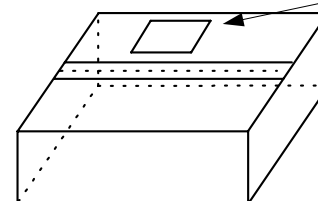
* The cardboard box B contains 4 cardboard box A at maximum.

The quantity is printed on this bag.

Caution Label



* Put the caution label on the cardboard box A.

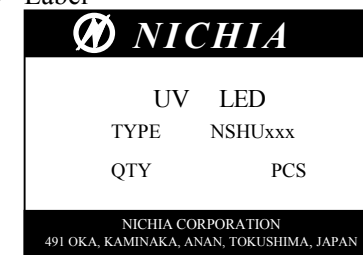


* Put the label on the cardboard box B.

Print



Label



NICHIA CORPORATION

Model	NSHUxxx
Title	PACKING
No.	010825102023